

CHROMOSOME NUMBERS IN VERNONIA (COMPOSITAE)

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The genus *Vernonia* is a member of the tribe Vernonieae of the Compositae, which is not as well known cytologically as the other tribes in the family. It is the largest genus in the tribe with about 1000 species of temperate and tropical America, Asia and Africa. The members of the genus are herbs or shrubs, and nearly all are perennial. The North American species of *Vernonia* were monographed by Gleason (1906) who also treated them in "North American Flora" in 1922. Chromosome numbers reported in *Vernonia* are summarized in Table 1. This list includes both Old and New World species. Gametic numbers of 9, 10, 16, 17, 18, 20, and 27 are indicated. The first known determination was in 1933 by G. W. Bohn, who counted $n=18$ in *V. baldwinii* (personal communication to the senior author, April, 1962). Grant (1953) suggested that the basic number for the genus may be 9 based on his record for *V. cinerea*, a species considered by Gleason to be one of the more primitive *Vernonia*. Additional work is needed, however, to establish Grant's hypothesis firmly. Hunter (1964), in a recent paper, has presented chromosome counts of $n=17$ for seven species and one hybrid. In connection with taxonomic studies in the genus, the chromosome numbers were obtained for 13 taxa and these are reported in this paper. Meiotic chromosome counts were obtained from pollen mother cell squashes. Buds were collected in the field or from transplants, and killed and fixed in modified Carnoy's (4 parts chloroform: 3 parts absolute alcohol: 1 part glacial acetic acid). All material was squashed and stained in acetocarmine. Voucher specimens were made and deposited in the University of Georgia Herbarium. Camera lucida drawings and photomicrographs were used to record the observations which were made from fresh mounts.

All plants studied had a gametic number of $n=18$. Differences in chromosome size and morphology were not discernible. Meiotic figures appeared normal. This was true even in those individuals suspected of being of hybrid origin. Hunter (1964) reports a gametic number of $n=17$ or ca. 17 for three of the taxa reported in this paper. The reason for, or the significance of this variation is not known at this time. It is possible that both $n=17$ and $n=18$ exist within the populations and taxa of this genus.

Hybridization frequently occurs in *Vernonia* (Gleason, 1906) and those that we have studied are no exception. Hybridization studies by Jones (1964a) demonstrated that all combinations of taxa attempted were cross-fertile. Certainly chromosome number would not be a limiting factor preventing hybridization. The taxa are usually ecologically or geographically isolated; however, these external barriers are not completely effective, producing much of the variation we find in populations of *Vernonia*. Field collected intermediates, as well as artificial F_1 hybrids, appear to undergo normal meiosis during pollen formation.

Since chromosome numbers are known for only about 30 of the possible 1000 species, it is obvious that additional cytotaxonomic work is needed in *Vernonia* before a realistic concept of cytological relationships in the genus may be established. Since the genus is widespread in temperate and tropical America, Asia, and Africa, geographic and taxonomic correlations of chromosome numbers might prove of interest.

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Table 1. Chromosome Numbers in *Vernonia* (Compositae).

Taxon	Chromosome Number	Author(s) or Vouchers ^a
<i>V. acaulis</i> (Walt.) Gleason	$n=17$	Hunter 1964
	$n=18$	22394, Duncan, Elbert Co., Ga.

^aVouchers collected by senior author unless otherwise noted.

<i>V. angustifolia</i> Michx.	$n=ca.17, 17$	Hunter 1964
<i>V. angustifolia</i> Michx. var. <i>angustifolia</i>	$n=18$	1055, McDuffie Co., Ga.; 1089, Camden Co., Ga.; 1119, Telfair Co., Ga.; 1112, Lowndes Co., Ga.; 1116, Coffee Co., Ga.; 1130, Wilkinson Co., Ga.
<i>V. angustifolia</i> Michx. var. <i>mohrii</i> S. B. Jones	$n=18$	1091, 1092, Duval Co., Fla.; 1059, Bibb Co., Ala.; 1060, 1061, Autauga Co., Ala.; 1054, Talbot Co., Ga.; 1096, Putnam Co., Fla.; 1102, Lake Co., Fla.; 1105, Alachua Co., Fla.; 1111, Lowndes Co., Ga.
<i>V. angustifolia</i> Michx. var. <i>scaberrima</i> (Nutt.) A. Gray	$n=18$	1075, Emanuel Co., Ga.; 1122, Hancock Co., Ga.; 1420, D. J. Banks, Claredon Co., S. C. 2595, Perry Co., Ala. Prameshwar 1960 ^b
<i>V. altissima</i> Nutt.	$n=18$	Bohn 1933
<i>V. anthelmintica</i> (L.) Willd.	$n=27$	1099, 1100, Charlotte Co., Fla. Mangenot et al. 1957 ^b ; Miege 1960 ^b ; Grant 1953
<i>V. baldwinii</i> Torr.	$n=18$	Mangenot et al. 1957 ^b
<i>V. blodgettii</i> Small	$n=18$	
<i>V. cinerea</i> (L.) Less.	$2n=18$	
<i>V. colorata</i> Drake	$2n=18$	
<i>V. X concinna</i> Gleason (pro sp.)	$n=18$	1093, Putnam Co., Fla.; 1104, Lake Co., Fla. Mangenot 1957 ^b
<i>V. conferta</i> Benth.	$2n=18$	
<i>V. X dissimilis</i> Gleason (pro sp.)	$n=18$	1063, Lee Co., Ala.; 1066, Harris Co., Ga. Riley and Hoff 1961 ^b
<i>V. glabra</i> Vatke	$2n=20$	Hunter 1964
<i>V. greggii</i> Gray	$n=17$	Hunter 1964
<i>V. guadalupensis</i> Heller	$n=17$	Mangenot 1958 ^b
<i>V. guineensis</i> Benth.	$2n=20$	
<i>V. interior</i> Small	$n=ca.17, 17$	Hunter 1964
<i>V. karvinskiana</i> DC.	$n=ca.17$	Turner et al. 1962 ^b
<i>V. kotschiana</i> Sch. Bip.	$2n=18$	Miege 1960 ^b
<i>V. lindheimeri</i> Gray	$n=ca.17, 17$	Hunter 1964
<i>V. marginata</i> (Torr.) Raf.	$n=17$	Hunter 1964

^bCited in "Index to Plant Chromosome Numbers," M. S. Cave, Editor.

<i>V. noveboracensis</i> (L.) Michx.	$n=18$	2604, Gwinett Co., Ga.
<i>V. nudiflora</i> Less.	$n=16$	Covas and Hunziker 1954 ^b
<i>V. ovalifolia</i> T. & G.	$n=18$	1095, Putnam Co., Fla.; 1104, Lake Co., Fla.
<i>V. perottetii</i> Sch. Bip.	$2n=18$	Miege 1960 ^b
<i>V. platensis</i> Les.	$n=20$	Cabrera 1944
<i>V. primulina</i> O. Hoffm.	$n=20$	Mangenot et al. 1958 ^b
<i>V. pulchella</i> Small	$n=18$	1084, Tattnal Co., Ga.; 1085, Long Co., Ga.
<i>V. X recurva</i> Gleason (pro sp.)	$n=18$	1077, Emanuel Co., Ga.; 1083, Tattnal Co., Ga.
<i>V. texana</i> (A. Gray) Small	$n=17$ $n=18$	Hunter 1964 2292, Franklin Co., Miss.; 2293, Amite Co., Miss.

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